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(71) Applicant *(for all designated States except US)*: S.P.A. ALFONSO BIALETTI & C. [IT/IT]; Via IV Novembre, 106, Località Crusinallo, I–28023 Omegna (IT).

(72) Inventors; and
(75) Inventors/Applicants *(for US only)*: MORONI, Ugo [IT/IT]; Via Carlo Cattaneo, 72, I–27043 Broni (IT). RANZONI, Francesco [IT/IT]; Via Sant'Angela Merici, 19, I–25032 Chiari (IT).

(74) Agents: SINISCALCO, Fabio et al.; Jacobacci & Perani, Via Visconti di Modrone, 7, I–20122 Milano (IT).

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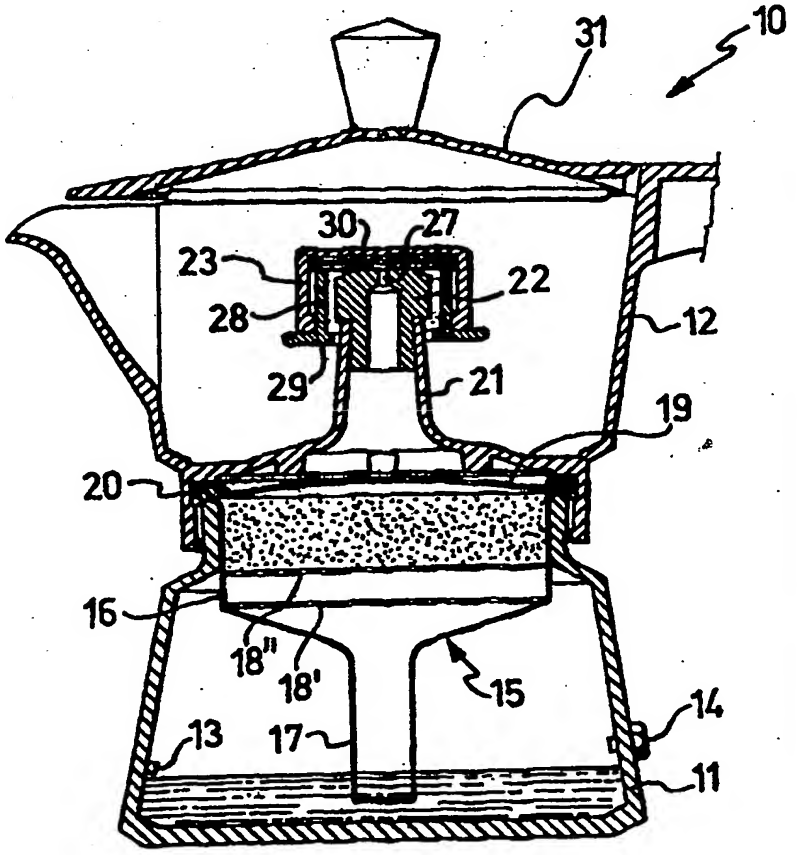
(54) Title: PRESSURE COFFEE MAKER FOR PREPARING COFFEE INFUSIONS

(57) Abstract

A coffee maker (10) comprises a boiler (11) designed to contain the water which is to be heated up, a coffee vessel (15) designed to hold a given amount of coffee powder, and a collecting vessel (12) designed to collect the coffee infusion produced as the hot water passes through the coffee powder; the coffee vessel (15) is in communication on the one hand with the inside of the boiler (11) and on the other hand with a duct (21) through which the coffee is dispensed; so that the coffee produced may be similar to that prepared using espresso coffee machines, valve means (22, 23) are provided along the path travelled by the hot fluid from the boiler (11) to the collecting vessel (12), which close off the said path in order to create a predetermined overpressure in the boiler (11) with respect to atmospheric pressure and which open up once the said overpressure in the boiler (11) has been attained.



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PRESSURE COFFEE MAKER FOR PREPARING COFFEE INFUSIONS

DESCRIPTION

The subject of the present invention is a pressure coffee maker for preparing coffee infusions.

Pressure coffee makers are known that comprise a boiler designed to contain the water which is to be heated up, a coffee vessel designed to hold a given amount of coffee powder, and a collecting vessel for collecting the coffee infusion.

Once water has been poured into the boiler and the coffee vessel has been filled with coffee powder, the water is brought to the boil in the boiler and, according to a well-known operating principle, the pressure generated inside the boiler as the water is heated forces the water up and through the coffee powder, through a filter in the coffee vessel and out through a second filter in the collecting vessel; the coffee infusion obtained in this way rises up a dispensing duct inside the collecting vessel and flows out of the top of the duct and into the collecting vessel.

This coffee maker is predominantly for domestic use and the boiler usually consists of a reservoir which is heated on a conventional cooker.

This method of preparing coffee is commonly used since it is simple, given the basic operations required, and cheap, given that the coffee maker itself is inexpensive.

However, the coffee infusion produced is not of an optimum quality since at the beginning of the cycle, before the temperature of the water has reached the correct infusion temperature, the pressure inside the boiler is already sufficient to allow warm water to pass into the coffee vessel which then causes the coffee to infuse at a temperature below the correct temperature; later infusion takes place at the correct temperature;

and lastly, towards the end of the cycle, infusion takes place at a temperature higher than the correct temperature.

At all events, the coffee produced does not look as good, smell as good or taste as good as that which can be made using espresso coffee machines. This is because in these machines the various parameters of the water, such as its temperature, pressure and speed, are set and constantly monitored so that an excellent cup of coffee is produced.

Obviously, these machines are much more expensive than coffee makers and also require greater expertise and more careful and regular maintenance.

What is more, the domestic models of these machines, even though obviously cheaper than the professional machines used in the trade, are still much bulkier than a coffee maker and require a space to be permanently set aside for them.

The object of the present invention is to provide a coffee maker which can produce a cup of coffee having similar characteristics to the coffee produced using espresso coffee machines.

This object is achieved by means of a coffee maker comprising a boiler designed to contain the water which is to be heated up, a coffee vessel designed to hold a given amount of coffee powder, and a collecting vessel designed to collect the coffee infusion produced as the hot water passes through the coffee powder, in which the coffee vessel is in communication on the one hand with the inside of the boiler and on the other hand with a duct through which the coffee is dispensed, characterized in that it comprises valve means, located along the path travelled by the hot fluid from the boiler to the collecting vessel, which close off the said path in order to create a predetermined overpressure in the boiler with respect to atmospheric

pressure and which open up once the said overpressure in the boiler has been attained.

In order to give a clearer understanding of the invention, two non-limiting embodiments thereof are described below and illustrated in the appended drawings, in which:

Fig. 1 is a sectional view of a coffee maker according to the invention;

Fig. 2 shows the way in which the coffee maker shown in Fig. 1 works;

Fig. 3 is a perspective view of a detail of the coffee maker shown in Fig. 1;

Fig. 4 is an exploded perspective view of another detail of the coffee maker shown in Fig. 1;

Figs 5 and 6 show the way in which the detail shown in Fig. 4 works;

Fig. 7 is a sectional view of another coffee maker according to the invention;

Fig. 8 shows the way in which the coffee maker shown in Fig. 7 works.

The coffee maker illustrated in Fig. 1, indicated as a whole by the reference numeral 10, comprises a boiler 11, consisting of a reservoir, and a collecting vessel 12 screwed on to the top of the boiler 11.

A reference mark 13, which consists of a protruding line, is provided at a given height on the inside surface of the boiler 11 and indicates the level to which the boiler should be filled with water. A safety valve 14 is also fixed to the wall of the boiler 11.

The boiler 11 accommodates a removable coffee vessel 15 (see also Fig. 3) comprising a cup part 16, the bottom of which extends into a tube 17 which is joined to the cup part by means of a conical portion. Two filters 18' and 18'', each consisting of a disc with a plurality of small holes, are provided inside the cup

part 16; these filters 18' and 18'' are integral with the cup part 16 and are arranged so that filter 18' lies in the base of the cup part while filter 18'' is raised a set distance above filter 18'. The rim of the coffee vessel 15 rests on the rim of the boiler 11.

On the bottom of the collecting vessel 12, above the coffee vessel 15, there is a filter 19 which also consists of a disc with small holes. Also on the bottom of the collecting vessel 12 is a seal 20 which comes between the collecting vessel and the boiler 11 and provides a leaktight joint between these two elements. Rising up in the centre of the collecting vessel 12 is a vertical dispensing duct 21, on the top portion of which are mounted valve means. These valve means comprise (see also Fig. 4) a nozzle 22 which is screwed into this top portion of the duct 21 and a shut-off cap 23 which has a set weight and presses on the nozzle 22 as a result of gravity. The nozzle 22 is hollow on the inside and consists of a head 24 and a threaded stem 25 which is screwed into the duct 21. The head 24 is square in shape with rounded corners 26 and also has a calibrated axial dispensing hole 27. The shut-off cap 23 is a hollow cylinder and is held on the nozzle 22 by means of a ring 28 on to which the shut-off cap screws. During assembly, the ring 28 is first fitted on to the duct 21, then the nozzle 22 is screwed into the duct 21, and lastly the shut-off cap 23 is screwed on to the ring 28. This ring has a internal flange 29 designed to bear against the corners 26 of the head 24, thereby preventing the shut-off cap from coming off the nozzle. The top of the shut-off cap 23 has a recess which accommodates a disc-shaped seal 30 that comes into contact with the head 24 of the nozzle 22, which head closes off the calibrated hole 27. A lid 31 is hinged to the collecting vessel 12.

The operation and method of use of the coffee maker 10 described above and illustrated will now be

described with reference to Figs 1, 2, 5 and 6.

The collecting vessel 12 is unscrewed from the boiler 11 and the coffee vessel 15 is removed from the boiler. The boiler 11 is then filled with water up to the level indicated by the reference mark 13, the coffee vessel 15 is replaced in the boiler and the cup part 16 of the coffee vessel 15 is filled with coffee powder. The collecting vessel 12 is then screwed back on to the boiler 11 and the coffee maker is placed on a heat source, such as a gas cooker or an electric hotplate, or some other source of heat.

The water and air inside the boiler 11 heat up, causing the pressure inside the boiler to increase. As the pressure increses, the hot fluid begins to rise along the path formed by the tube 17, the cup part 16, in which the water spreads out and completely bathes the coffee powder after passing through the filters 18' and 18'', the duct 21 which the infusion produced reaches after passing through the filter 19, and the nozzle 22. Once a predetermined pressure above atmospheric pressure has been reached, the shut-off cap 23 lifts up, thereby opening up the calibrated hole 27. At this point all the fluid flows rapidly along the abovementioned path and the infusion thus produced comes out of the hole 27, passes through the spaces formed between the shut-off cap 23 and the nozzle 22 as a result of the different shapes of these two components, and spills out into the collecting vessel 12.

The coffee made in this way boasts characteristics similar to those of coffee prepared using espresso coffee machines and in particular has a creamy top and a similar taste.

These results are possible by virtue of the valve means which allow specific physical and dynamic conditions in the preparation of the coffee, such as the boiler pressure at which the water is forced to rise up

and infuse the coffee, and the temperature and speed of the water which are both dependent on this pressure value, to be predetermined.

This pressure value is preferably greater than 1.4 bar. Needless to say, the weight of the shut-off cap 23 and the diameter of the nozzle 22 will be functions of this pressure value.

The water/air volumetric ratio does not exceed 1:2 and, preferably, as in the example illustrated, is less than 1:3.

The fact that the coffee powder is supported on the top filter 18'', which is raised above the base of the cup part, together with the presence of the filters 18' and 18'', means that the coffee powder is bathed uniformly by the water as it rises and covers the entire surface of the coffee, preventing the formation of preferential fluid trickles which would reduce infusion efficiency. Needless to say, the top filter 18'' and the filter 19 prevent the coffee powder from spilling out of the recess formed for it by the said filters.

The valve means described and illustrated are simple in terms of both their structure and function. This is because they consist of only a few components and the shut-off cap works solely by gravity. As far as maintenance is concerned, these valve means can easily be dismantled and reassembled by means of basic unscrewing and screwing actions without the need for tools.

The shut-off cap 23 also acts as a splash guard, preventing splashes of coffee spattering out of the collecting vessel 12.

In the event of a malfunction, the safety valve 14 prevents dangerous overpressures from building up in the coffee maker.

Figs 7 and 8 show another coffee maker, indicated as a whole by the reference numeral 40, which is basically the same as the coffee maker 10, but in which

the shut-off cap is fixed to the lid 31. In the coffee maker 40, the dispensing duct, the nozzle and its associated parts, and the shut-off cap and its associated parts are indicated using the same reference numerals as for the coffee maker 10 but, as they are slightly different, these reference numerals are followed by the letter A, whereas the other components, which are identical to those of the coffee maker 10, are indicated using the same reference numerals. In this second embodiment, once the pressure in the boiler has reached a pre-established threshold, instead of only the shut-off cap lifting up, the shut-off cap/lid assembly lifts up, as shown in Fig. 8. Needless to say, in this case, the abovementioned assembly needs to be calibrated so that the hole 27 in the nozzle 22 opens up at the pre-established pressure value. Elastic snap-fastening elements may also be incorporated between the lid 31 and the collecting vessel 12 which allow the lid a small amount of play in order to lift up the shut-off cap, and which, by means of a simple unfastening action, allow the lid to be fully opened whenever necessary and then, by means of a fastening action, allow it to be closed again.

The components of both coffee makers can be made of any material, for example aluminium, steel, or some other material. The shut-off cap, together with its corresponding ring in the embodiment of Fig. 1, can also be made of a heat-insulating material, such as teflon, so as to prevent the coffee infusion from cooling down as it comes out of the nozzle; in this case, these components can have a metal core so as to make them heavier.

Modifications or additions may be made to the coffee makers described and illustrated.

The coffee maker need not have the shape illustrated and can come in any shape, as long as the coffee

can be prepared in the way envisaged.

The same applies to the coffee maker components. The coffee vessel may have a single, raised, filter, even though the double-filter version illustrated enables an optimum infusion to be produced. The water level reference mark may be made using any means suited to the purpose. The nozzle can be of any polygonal shape or may be of another suitable shape.

The boiler may include electrical heating elements which can be connected to any electricity supply, thereby doing away with the need for a cooker.

As regards the valve means, the components referred to above may also undergo modifications in shape. Generally speaking, any form of valve may be provided along the said path travelled by the hot water and the infusion, and which does not, therefore, necessarily act on the nozzle but, for example, acts upstream thereof, as long as it fulfils the functions set out above. The shut-off cap may be elastically preloaded by a spring which acts on the said cap or, in cases where the shut-off cap is integral with the lid, acts on the lid, rather than acting only under the effect of its own weight. However, the valve means described above and illustrated are particularly simple and reliable.

It would also be possible to dispense the coffee infusion directly into the cups via the dispensing duct (or several dispensing ducts). In this case, the cups themselves act as the collecting vessel rather than a container that forms part of the coffee maker.

The coffee maker can be filled with loose coffee powder or with coffee powder which has been packed in a special permeable sachet designed to fit in the cup part of the coffee vessel.

* * *

CLAIMS

1. Coffee maker (10, 40) comprising a boiler (11) designed to contain the water which is to be heated up, a coffee vessel (15) designed to hold a given amount of coffee powder, and a collecting vessel (12) designed to collect the coffee infusion produced as the hot water passes through the coffee powder, in which the coffee vessel (15) is in communication on the one hand with the inside of the boiler (11) and on the other hand with a duct (21; 21A) through which the coffee is dispensed, characterized in that it comprises valve means (22, 23; 22A, 23A), located along the path travelled by the hot fluid from the boiler (11) to the collecting vessel (12), which close off the said path in order to create a predetermined overpressure in the boiler (11) with respect to atmospheric pressure and which open up once the said overpressure in the boiler (11) has been attained.

2. Coffee maker according to Claim 1, in which the said valve means comprise a shut-off cap (23; 23A) which has a predetermined weight and can move between a position in which it shuts off the said path as a result of gravity, and a lifted position.

3. Coffee maker according to Claim 2, in which the said shut-off cap (23) is mounted on a nozzle (22) located on the outlet end of the duct (21) and in which retention means (26, 28) hold the shut-off cap (23) on the nozzle (22), the shut-off cap (23) being able to move between a position in which it shuts off the nozzle (22) and a lifted position in which it is held by the retention means (26).

4. Coffee maker according to Claim 3, in which the shut-off cap (23) is a hollow cylinder with its top pressing on the nozzle (22), in which the nozzle (22) is polygonal in shape, and in which a ring (28) is provided

which is removably coupled to the shut-off cap (23) and has a internal flange (29) opposite the top of the shut-off cap (23) so that the nozzle (22) lies between the said top and the said flange, the said flange (29) being designed to bear against the corners (26) of the nozzle (22) in order to hold the shut-off cap (23) on the nozzle (22).

5. Coffee maker according to Claim 4, in which a leaktight seal (30) that closes off the hole (27) in the nozzle (22) is housed in the top of the shut-off cap (23).

6. Coffee maker according to Claim 2, in which the shut-off cap (23A) is fixed to a lid (31) which is hinged to the collecting vessel (12) and closes off the end of the coffee-dispensing duct (21A).

7. Coffee maker according to Claim 6, in which the shut-off cap (23A) is hollow and, with its top, closes off a nozzle (22A) which is fixed to the said end of the coffee-dispensing duct (21A).

8. Coffee maker according to Claim 7, in which a leaktight seal (30A) which closes off the hole (27A) in the nozzle (22A) is housed in the top of the shut-off cap (23A).

9. Coffee maker according to any one of the preceding claims, in which the overpressure generated in the boiler (11) by the said shut-off cap (23; 23A) is greater than 1.4 bar.

10. Coffee maker according to any one of the preceding claims, in which the boiler (11) comprises reference means (13) which define a water/air volumetric ratio in the boiler which does not exceed 1:2.

11. Coffee maker according to Claim 10, in which the said reference means (13) define a water/air volumetric ratio in the boiler which is less than 1:3.

12. Coffee maker according to any one of the preceding claims, in which the coffee vessel (15) comprises a

cup part (16) and a tube (17) that places the cup part (16) in communication with the boiler (11) so that the water can pass up into it, and in which the cup part (16) is joined to the tube (17) by means of a conical portion and has a perforated filter (18') in the base of the cup part (16) and an additional perforated filter (18''), which supports the coffee powder, positioned a short distance above the preceding filter (18').

13. Method of preparing coffee by passing water heated in a boiler (11) through a coffee vessel (15) which contains coffee powder and then conveying the coffee infusion into a collecting vessel (12), characterized in that the path between the boiler (11) and the collecting vessel (12) is closed off and is opened up once a predetermined overpressure with respect to atmospheric pressure is attained in the boiler (11).

14. Method according to Claim 13, in which the said overpressure exceeds 1.4 bar.

15. Method according to Claim 13 or 14, in which the water/air volumetric ratio in the boiler (11) does not exceed 1:2.

16. Method according to Claim 15, in which the water/air volumetric ratio in the boiler (11) is less than 1:3.

17. Method according to any one of Claims 13, 14, 15 or 16, in which the flow of water through the coffee vessel (15) spreads out until its cross-section is equal to the surface area of the coffee powder to be infused and, after a predetermined distance, the flow of water is brought into contact with the coffee powder.

* * *

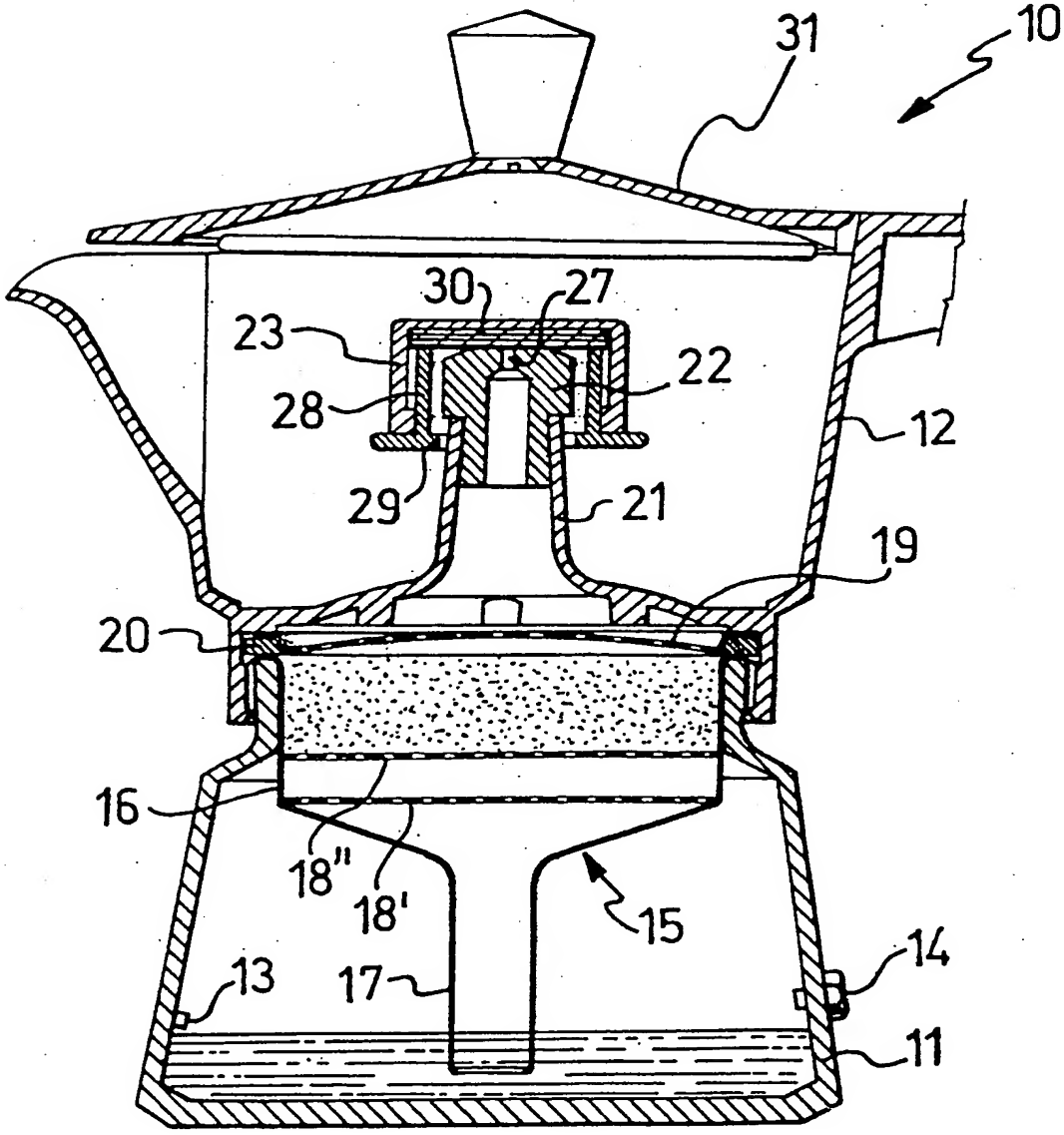

FIG.1

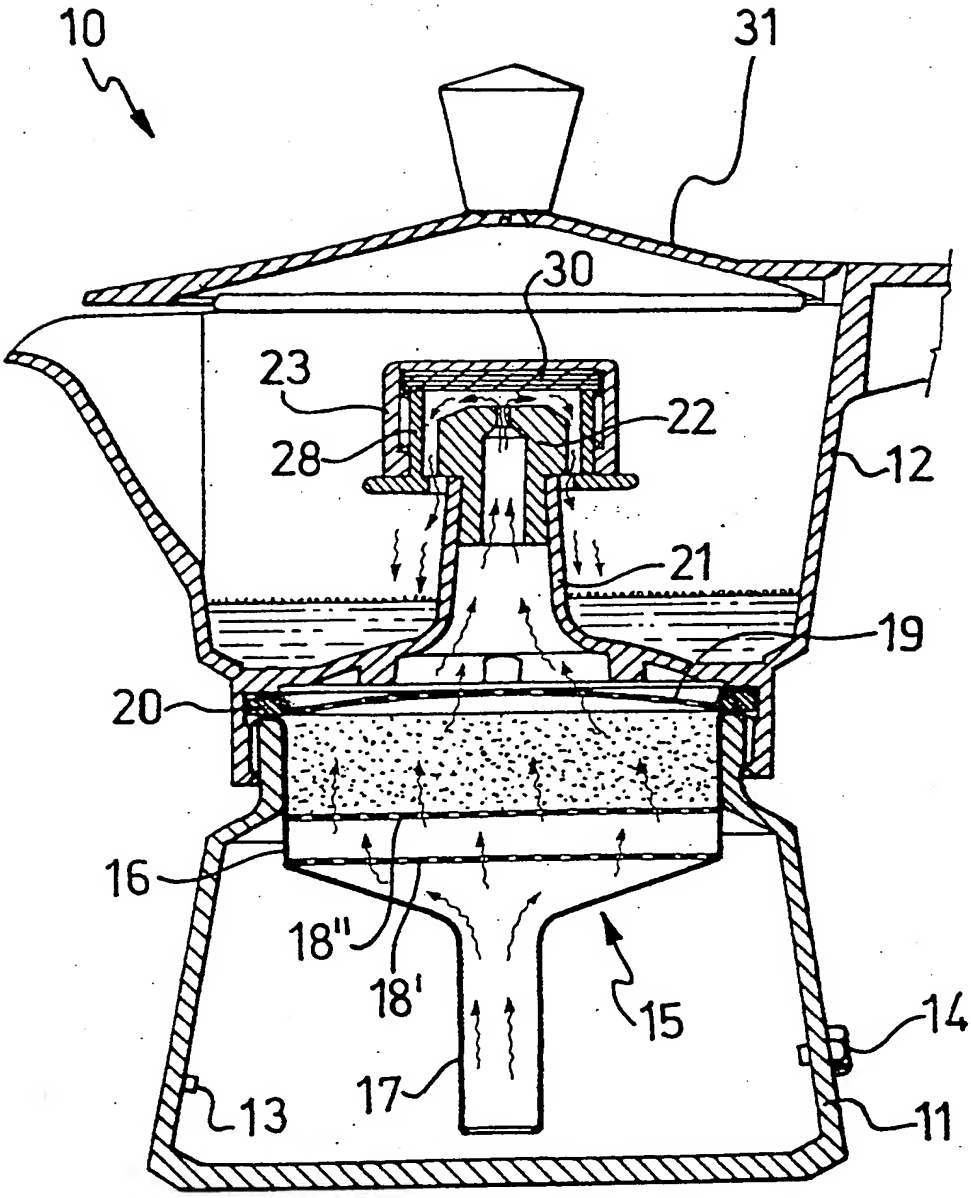

FIG.2

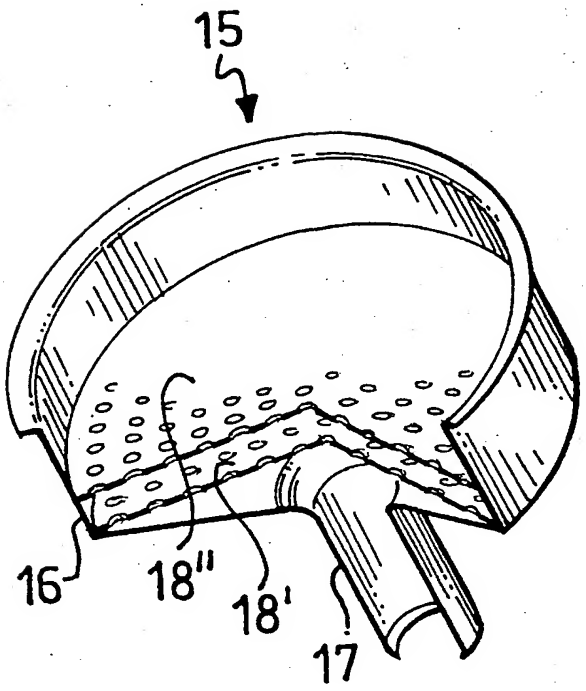

FIG.3

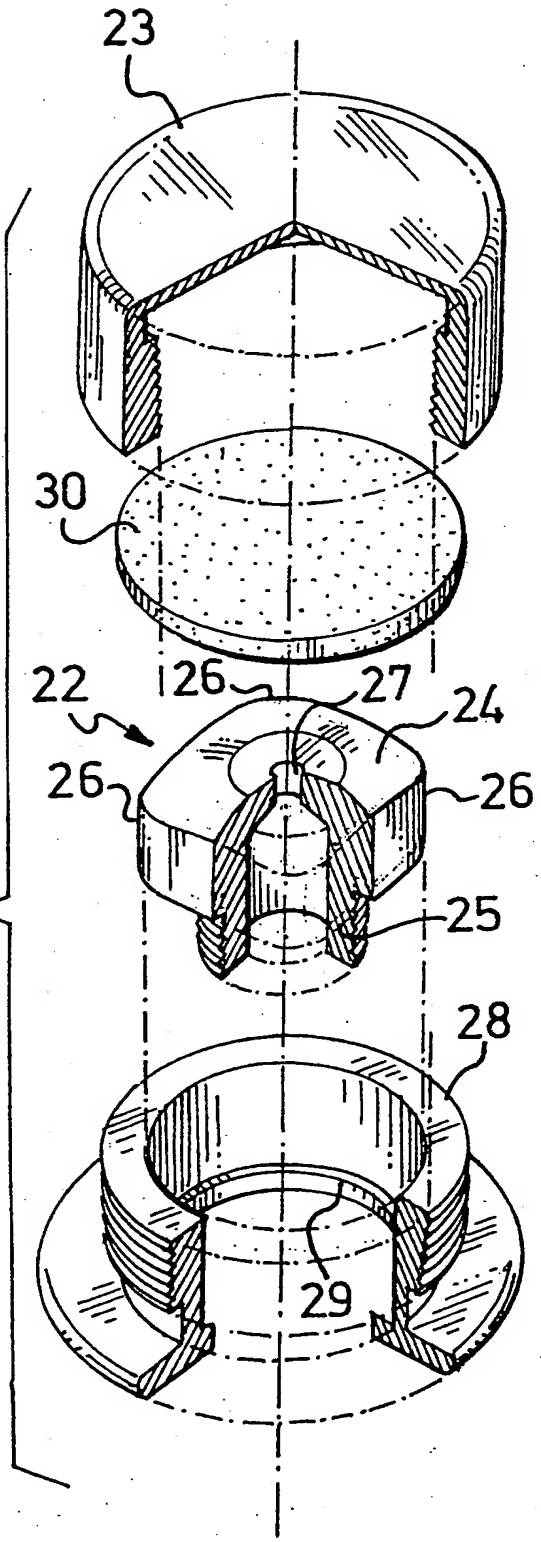

FIG.4

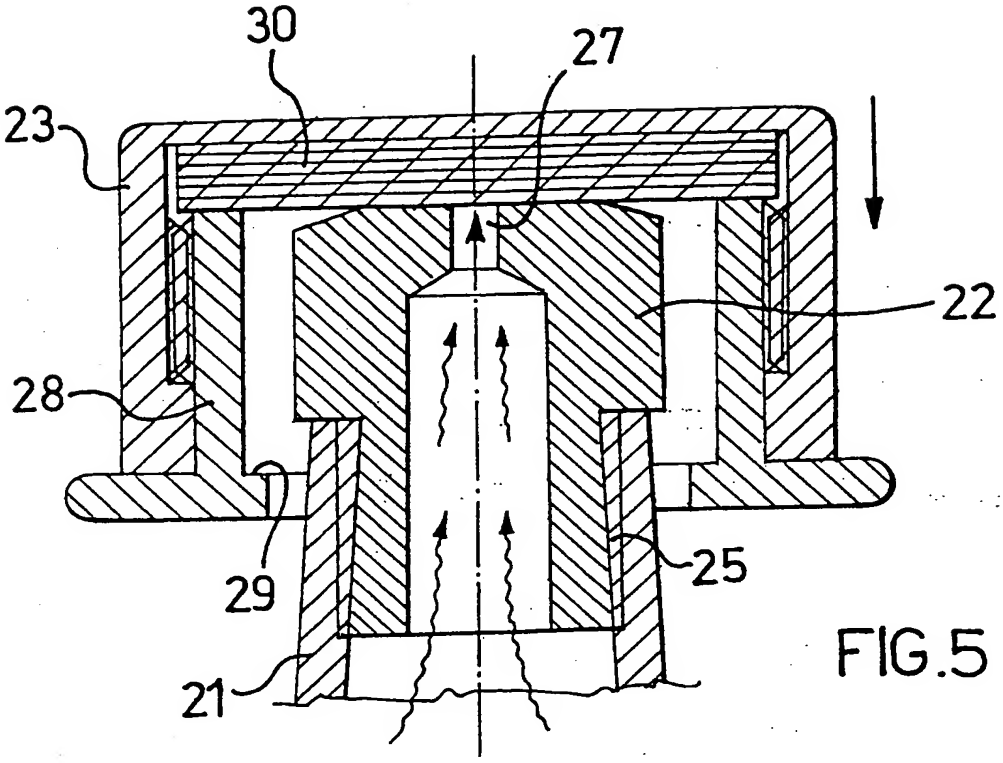

FIG.5

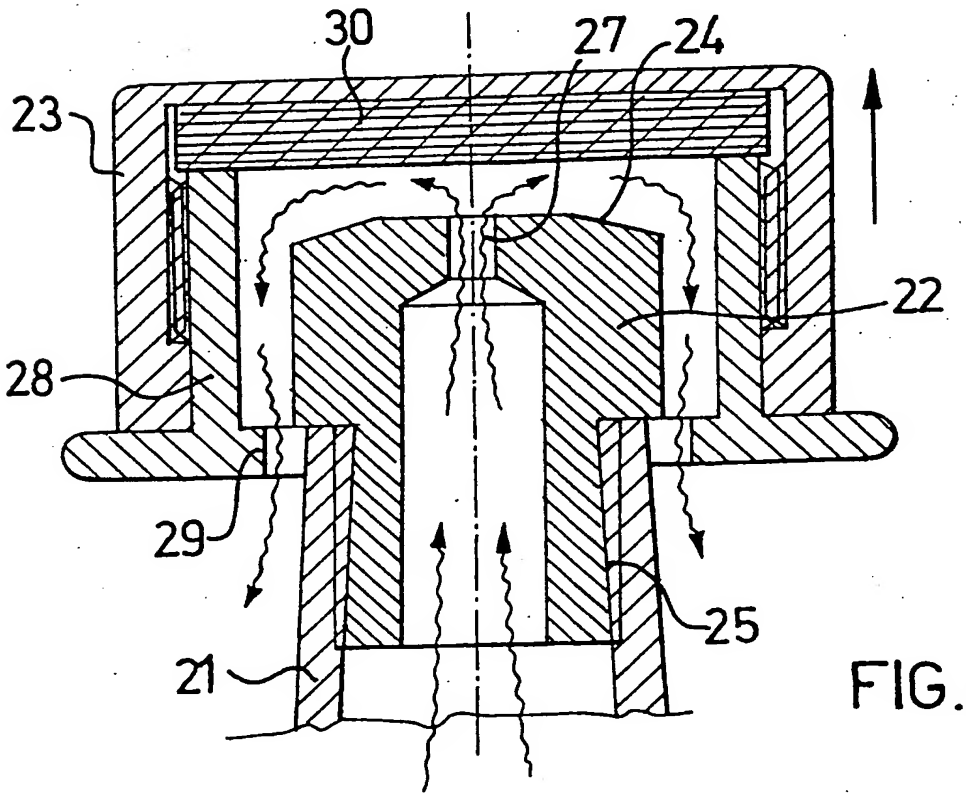

FIG.6

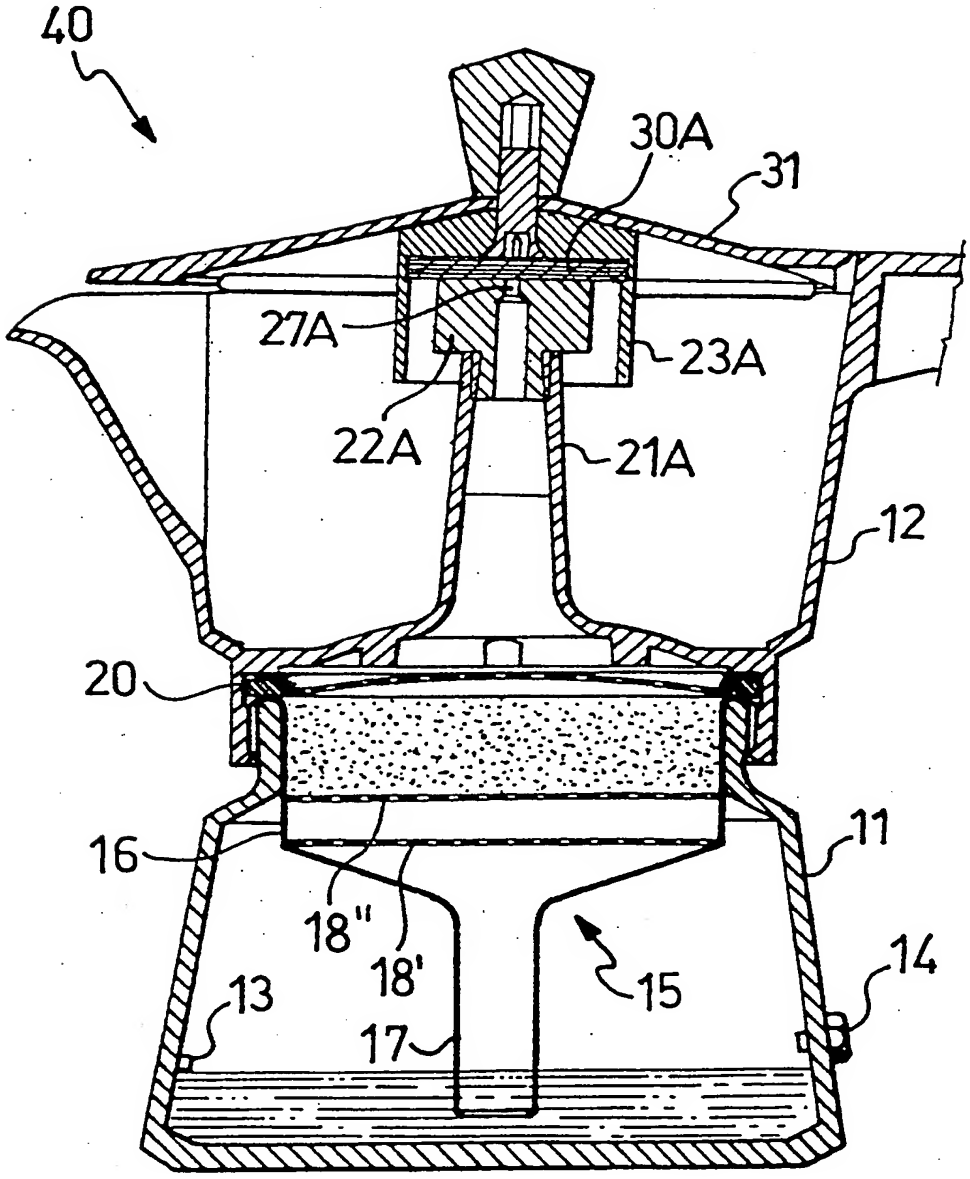

FIG.7

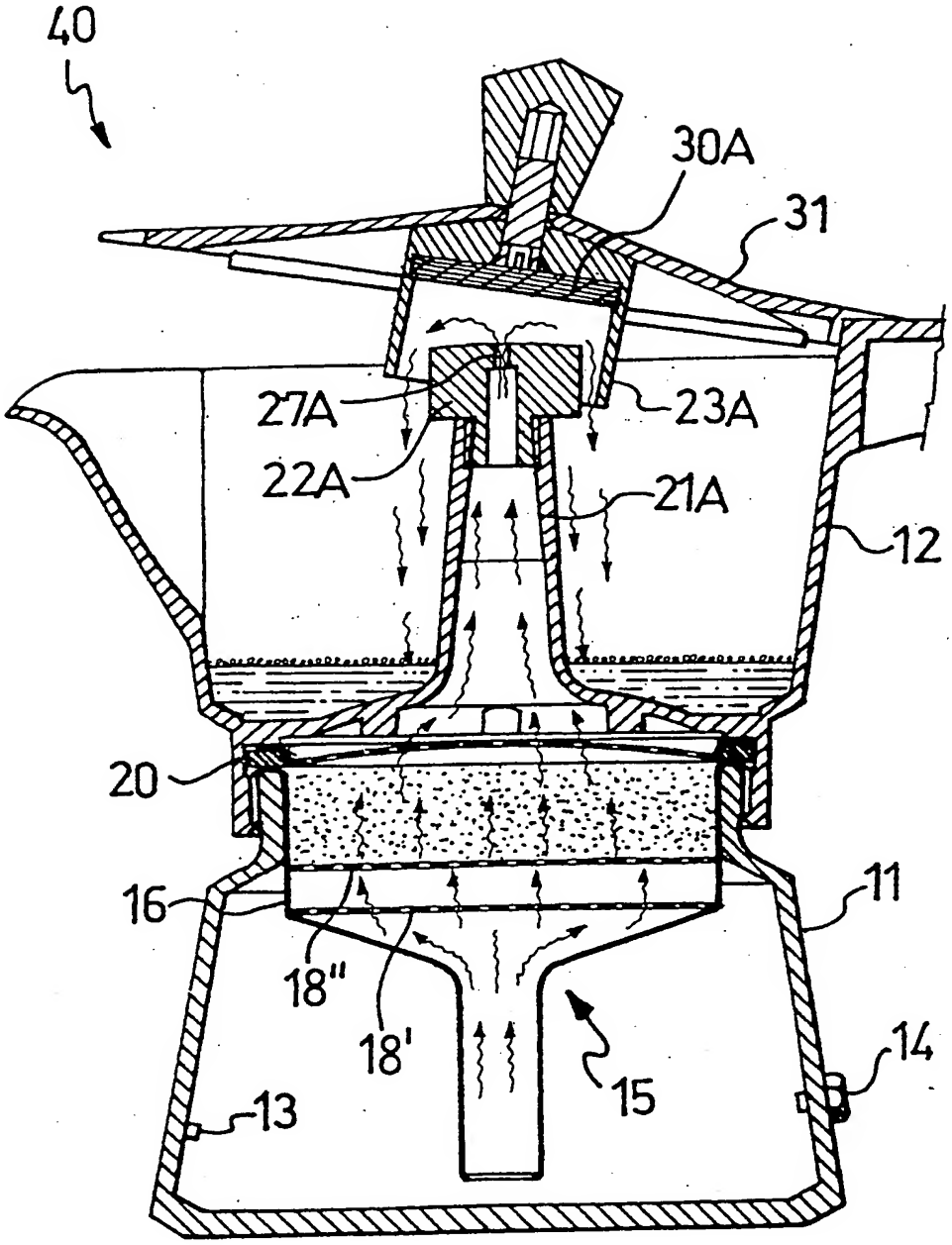

FIG.8

INTERNATIONAL SEARCH REPORT

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PCT/IT 96/00247

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 A47J31/04

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 A47J

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	FR 1 061 936 A (P. STEPHAN) 16 April 1954 see page 1, left-hand column, paragraph 4 - right-hand column, paragraph 3; figures 1,2 & IT 494 993 A (P. STEPHAN) ---	1-3,9, 13,14
X	AT 25 084 A (F. SCHWARZER, J. MACEK) 25 July 1906 see page 1, line 1 - line 23; figures 1,2 ---	1-3,13
X	FR 875 571 A (J.-J.-M. CLAUDEL) 1 October 1942 see page 1, line 14 - line 54; figures 1-3 --- -/--	1,13

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
12 June 1997	Liliane v. VELZEN-PERON 27 -06- 1997
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+ 31-70) 340-2040, Tx. 31 651 epo nl, Fax (+ 31-70) 340-3016	Authorized officer Schmitt, J

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	FR 1 206 493 A (C. ALBERTINI) 10 February 1960 see page 1, right-hand column, line 5 - paragraph 6; figure ---	10,12, 15,17
A	US 3 077 156 A (M. EGI, A.I. NOVI) 12 February 1963 -----	

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INTERNATIONAL SEARCH REPORT

Information on patent family members

Inter[illegible]ation No
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FR 1061936 A	16-04-54	NONE	
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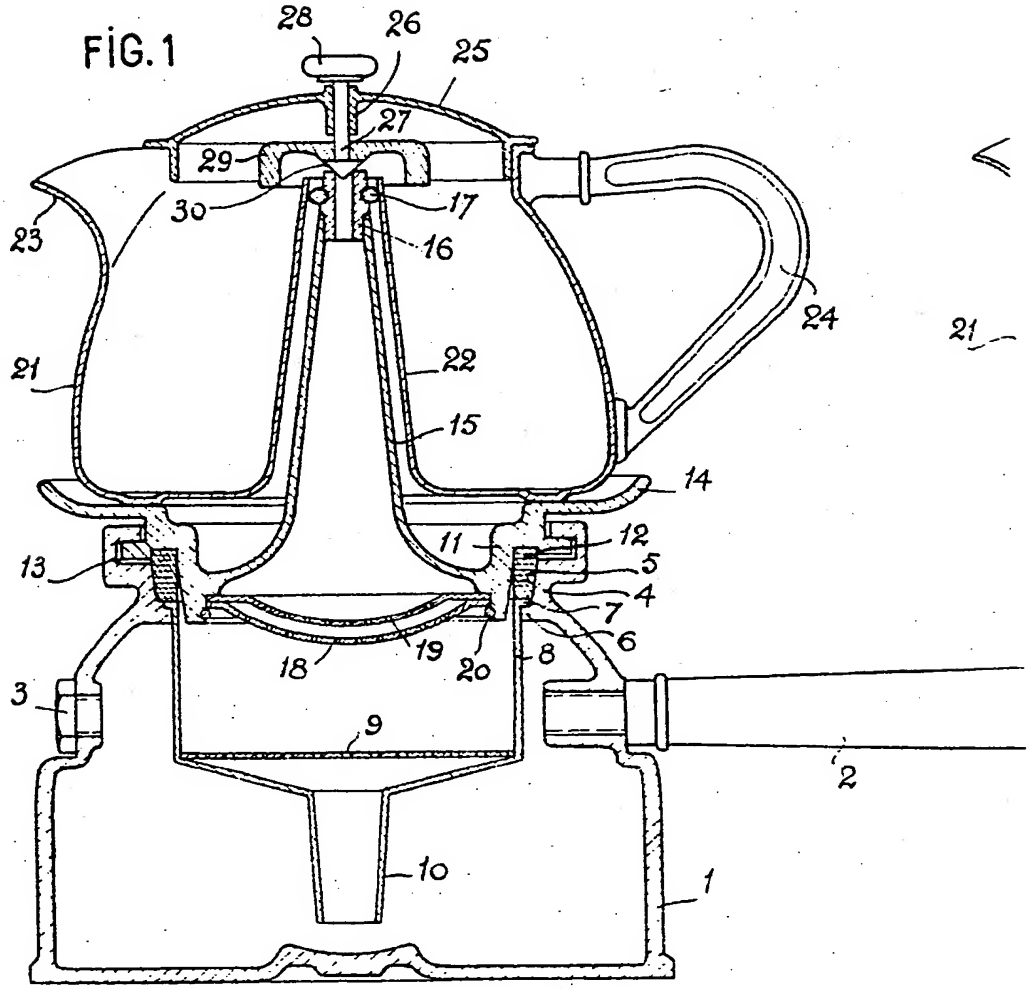
FR 1206493 A	10-02-60	NONE	
US 3077156 A	12-02-63	NONE	

FIG. 1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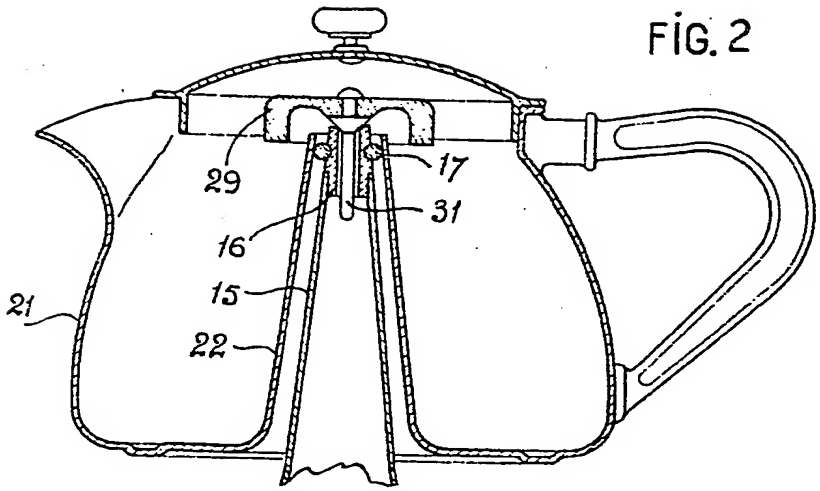
13
5
4
7
6
18
19
20
8
3
9
2
10
1

FIG. 2



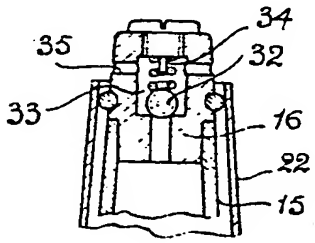


FIG. 3

FIG. 4